AMENDMENTS TO THE CLAIMS

Claims 1-53 Canceled

Claim 54 (Currently Amended) A fibrous nanocarbon comprising a plurality of carbon nano-fibrous rods gathered together, wherein each carbon nano-fibrous rod has a central axis and axial end portions, and comprises 2-12 hexagonal carbon layers extending in one ~~direction.~~ direction, and

wherein said hexagonal carbon layers have an axial width (D) of 2.5 ± 0.5 nm, and a length (L) of 17 ± 0.5 nm, and

wherein said plurality of carbon nano-fibrous rods are stacked in a stacking direction and the length of each of the hexagonal carbon layers is larger than a dimension of the stacked hexagonal carbon layers, the dimension being in the stacking direction of the hexagonal carbon layers.

Claim 55 Canceled

Claim 56 (Previously Presented) The fibrous nanocarbon according to claim 54, wherein said 2 to 12 hexagonal carbon layers are stacked in said carbon nano-fibrous rods.

Claim 57 Canceled.

Claim 58 (Previously Presented) The fibrous nanocarbon according to claim 54, wherein said carbon nano-fibrous rods are stacked in a three-dimensionally close-packed state.

Claim 59 (Currently Amended) The fibrous nanocarbon according to claim 54, wherein said plurality of the carbon nano-fibrous rods are stacked in ~~a stacking~~ the stacking direction with said central axes thereof being parallel to each other, to constitute a carbon nano-fibrous rod cluster.

Claim 60 (Previously Presented) The fibrous nanocarbon according to claim 59, wherein said carbon nano-fibrous rods are three-dimensionally stacked so as to form nano-gaps between said carbon nano-fibrous rods.

Claim 61 (Previously Presented) The fibrous nanocarbon according to claim 54, wherein said carbon nano-fibrous rods are joined in series at said axial end portions to constitute a tubular carbon nano-fibrous rod cluster.

Claim 62 (Previously Presented) The fibrous nanocarbon according to claim 61, wherein said axial end portions of said carbon nano-fibrous rods are joined by heat treatment.

Claim 63 (Previously Presented) The fibrous nanocarbon according to claim 59, wherein said carbon nano-fibrous rods constituting said carbon nano-fibrous_rod cluster are arranged at an arrangement angle of larger than 0 degree but smaller than 20 degrees with respect to an axis perpendicular to a fiber axis extending in said stacking direction, thereby forming a columnar shape.

Claim 64 (Previously Presented) The fibrous nanocarbon according to claim 59, wherein said carbon nano-fibrous rods constituting said carbon nano-fibrous rod cluster are arranged at an arrangement angle of larger than 20 degrees but smaller than 80 degrees with respect to an axis perpendicular to a fiber axis extending in said stacking direction, thereby forming a feather shape.

Claim 65 (Previously Presented) The fibrous nanocarbon according to claim 64, wherein said carbon nano-fibrous rod cluster has a herringbone structure.

Claim 66 (Previously Presented) The fibrous nanocarbon according to claim 63, wherein in said carbon nano-fibrous rods an interplanar distance (d_{002}) between said 2-12 hexagonal carbon layers is less than 0.500 nm under heat treatment conditions at 700°C or lower.

Claim 67 (Previously Presented) The fibrous nanocarbon according to claim 63, wherein a fiber width of an aggregate of said carbon nano-fibrous rods is 8 to 500 nm, and a fiber aspect ratio (fiber length/fiber width) of said aggregate is 10 or more.

Claim 68 (Previously Presented) The fibrous nanocarbon according to claim 61, wherein said carbon nano-fibrous rods constituting said carbon nano-fibrous rod cluster are arranged at an arrangement angle of 80 degrees to 88 degrees with respect to an axis perpendicular to a fiber axis extending in said stacking direction, thereby forming a tubular shape.

Claim 69 (Previously Presented) The fibrous nanocarbon according to claim 68, wherein a fiber width of an aggregate of said carbon nano-fibrous rods is 8 to 80 nm, and a fiber aspect ratio (fiber length/fiber width) of said aggregate is 30 or more.

Claim 70 (Previously Presented) The fibrous nanocarbon according to claim 63, wherein said carbon nano-fibrous rod cluster has a polygonal cross sectional structure in a direction perpendicular to said fiber axis.

Claim 71 (Previously Presented) The fibrous nanocarbon according to claim 63, wherein said axial end portions of said carbon nano-fibrous rods on a surface of said fibrous nanocarbon are two-dimensionally loop-shaped and three-dimensionally dome-shaped under heat treatment at 1,600 °C or higher.

Claim 72 (Currently Amended) A method for producing fibrous nanocarbon comprising an aggregate of carbon nano-fibrous rods by reacting a carbon material in a high temperature fluidized bed with a catalyst, said method comprising using, as a fluid material, a dual-purpose catalyst/fluid material comprising a metal catalyst and a catalyst-supporting carrier bound via a binder; and performing

a first gas supply step of supplying a reducing gas,

a carbon material supply step of supplying the carbon material in a gaseous state to produce a carbon nano-fibrous rod comprising 2 to 12 hexagonal carbon layers extending in one

direction, in a presence of the metal catalyst of the dual-purpose catalyst/fluid material, and

a second gas supply step of supplying a carbon-free inert gas and heating the dual-purpose catalyst/fluid material by a heating means to a higher temperature than a reaction temperature for reaction between the dual-purpose catalyst/fluid material and the carbon material, so as to eliminate a fluidizing function of the dual-purpose catalyst/fluid~~ material.~~ material;

wherein said hexagonal carbon layers each have an axial width (D) of 2.5±0.5 nm, and a length (L) of 17±15 nm, and

wherein said plurality of carbon nano-fibrous rods are stacked in a stacking direction and the length of each of the hexagonal carbon layers is larger than a dimension of the stacked hexagonal carbon layers, the dimension being in the stacking direction of the hexagonal carbon layers.

Claim 73 (Previously Presented) The method for producing fibrous nanocarbon according to claim 72, wherein an average particle diameter of the dual-purpose catalyst/fluid material is 0.2 to 20 mm.

Claim 74 (Previously Presented) The method for producing fibrous nanocarbon according to claim 72, wherein the dual-purpose catalyst/fluid material comprises a product formed by supporting the metal catalyst on a surface of the carrier, or an agglomerate of the carrier.

Claim 75 (Previously Presented) The method for producing fibrous nanocarbon according to claim 72, wherein the carrier of the dual-purpose catalyst/fluid material is any one of carbon black, alumina, silica, silica sand, and aluminosilicate.

Claim 76 (Previously Presented) The method for producing fibrous nanocarbon according to claim 72, wherein the metal catalyst of the dual-purpose catalyst/fluid material is any one of Fe, Ni, Co, Cu and Mo, or is a mixture of at least two of these metals.

Claim 77 (Previously Presented) The method for producing fibrous nanocarbon according to claim 72, wherein a flow velocity in the fluidized bed is 0.02 to 2 m/s.

Claim 78 (Previously Presented) The method for producing fibrous nanocarbon according to claim 72, further comprising controlling a plurality of conditions in each of said first gas supply step, said carbon material supply step, and said second gas supply step independently of one another.

Claim 79 (Previously Presented) The method for producing fibrous nanocarbon according to claim 78, wherein said conditions are a temperature, a pressure, a time, and a gas atmosphere.

Claim 80 (Previously Presented) The method for producing fibrous nanocarbon according to claim 72, wherein in said carbon material supply step the metal catalyst of the dual-purpose catalyst/fluid material and the carbon material are brought into contact with each other at a temperature of 300 to 1,300°C in a gas mixture of hydrogen and an inert gas (hydrogen partial pressure 0 to 90%) at a pressure of 0.1 to 25 atmospheres, thereby producing the fibrous nanocarbon.

Claim 81 (Previously Presented) The method for producing fibrous nanocarbon according to claim 72, further comprising metallizing and finely dividing the metal catalyst of the dual-purpose catalyst/fluid material by a reducing action of the reducing gas in at least one of said first gas supply step and said carbon material supply step.

Claim 82 (Previously Presented) The method for producing fibrous nanocarbon according to claim 81, further comprising finely dividing the metal catalyst of the dual-purpose catalyst/fluid material while controlling a particle diameter of the metal catalyst, thereby controlling a diameter of the fibrous nanocarbon.

Claim 83 (Previously Presented) The method for producing fibrous nanocarbon according to claim 72, wherein said second gas supply step forms a high velocity flow zone in the fluidized bed to promote fine division and wear of the dual-purpose catalyst/fluid material by a collision between particles of the dual-purpose catalyst/fluid material, or a collision between the particles

and a wall surface of the fluidized bed.

Claim 84 (Previously Presented) The method for producing fibrous nanocarbon according to claim 83, wherein the high velocity flow zone in the fluidized bed is formed in a lower portion of the fluidized bed.

Claim 85 (Previously Presented) The method for producing fibrous nanocarbon according to claim 83, wherein the high velocity flow zone is formed by flowing a high velocity gas into the fluidized bed.

Claim 86 (Previously Presented) The method for producing fibrous nanocarbon according to claim 85, further comprising supplying particles, which have scattered from the fluidized bed, back into the fluidized bed while entraining the particles in the high velocity gas.

Claim 87 (Previously Presented) The method for producing fibrous nanocarbon according to claim 72, further comprising separating the fibrous nanocarbon from the carrier or the catalyst of the dual-purpose catalyst/fluid material.

Claim 88 (Previously Presented) The method for producing fibrous nanocarbon according to claim 72, wherein the fibrous nanocarbon is produced with an apparatus comprising:

a first fluidized bed reactor charged with the dual-purpose catalyst/fluid material and provided with heating means for heating an interior of the first fluidized bed reactor;

first gas supply means for supplying the reducing gas into the first fluidized bed reactor;

carbon material supply means for supplying the carbon material in a gaseous state into said first fluidized bed reactor to produce the fibrous nanocarbon comprising an aggregate of carbon nano-fibrous rods, which each comprise 2 to 12 hexagonal layers extending in one direction;

second gas supply means for supplying the carbon-free gas into the first fluidized bed reactor; and

a discharge line for discharging a first gas and particles scattered from the first fluidized

bed reactor.

Claim 89 (Previously Presented) The method for producing fibrous nanocarbon according to claim 88, wherein the apparatus further comprises a recovery means for recovering the scattered particles provided in the discharge line.

Claim 90 (Previously Presented) The method for producing fibrous nanocarbon according to claim 88, wherein a fluidized bed portion of the first fluidized bed reactor has a high velocity flow portion and a low velocity flow portion.

Claim 91 (Previously Presented) The method for producing fibrous nanocarbon according to claim 90, wherein the high velocity flow portion includes a collision portion is.

Claim 92 (Previously Presented) The method for producing fibrous nanocarbon according to claim 88, further comprising blowing a gas at a high velocity into the fluidized bed reactor with a high velocity gas blowing means.

Claim 93 (Previously Presented) The method for producing fibrous nanocarbon according to claim 92, wherein when the gas is blown at a high velocity, recovered particles are entrained in the gas.

Claim 94 (Previously Presented) The method for producing fibrous nanocarbon according to claim 88, wherein in said apparatus

a first flow chamber, a second flow chamber, and a third flow chamber, adapted to allow the fluid material to flow, are disposed within the fluidized bed reactor,

the first gas supply means is connected to the first flow chamber;

the carbon material supply means is connected to said second flow chamber; and

said second gas supply means is connected to said third flow chamber.

Claim 95 (Previously Presented) The method for producing fibrous nanocarbon according to

claim 88, wherein the apparatus further comprises:

a first flow chamber and a second flow chamber adapted to allow the fluid material to flow, the first and second flow chambers being disposed within the fluidized bed reactor;

a second fluidized bed reactor different from the fluidized bed reactor is provided as a third flow chamber; and

a transport means for transporting the fluid material from the second flow chamber to the third flow chamber; wherein

the first gas supply means is connected to the first flow chamber,

the carbon material supply means is connected to the second flow chamber, and

the second gas supply means is connected to the third flow chamber.

Claim 96 (Previously Presented) A method for producing fibrous nanocarbon according to claim 72, wherein the fibrous nanocarbon is produced with an apparatus comprising:

a first fluidized bed reactor having an interior charged with the dual-purpose catalyst/fluid material, a heating means for heating the interior , and a first gas supply means for supplying the reducing gas into the first fluidized bed reactor;

a second fluidized bed reactor having a transport means for transporting the fluid material from the first fluidized bed reactor, and a carbon material supply means for supplying the carbon material in a gaseous state into the second fluidized bed reactor to produce a fibrous nanocarbon comprising an aggregate of carbon nano-fibrous rods which each comprise 2-12 hexagonal carbon layers extending in on direction;

a third fluidized bed reactor having a transport means for transporting the fluid material and a reaction product from said second fluidized bed reactor, and having second gas supply means for supplying the carbon-free gas into said third fluidized bed reactor; and

a discharge line for discharging a gas and particles scattered from said third fluidized bed reactor.

Claim 97 (Previously Presented) The method for producing fibrous nanocarbon according to claim 96wherein the apparatus includes a plurality of the first fluidized bed reactors.

Claim 98 (Previously Presented) The method for producing fibrous nanocarbon according to claim 96, wherein the apparatus includes a plurality of the second fluidized bed reactors.

Claim 99 (Previously Presented) The method for producing fibrous nanocarbon according to claim 96, wherein the apparatus includes a plurality of the third fluidized bed reactors.

Claim 100 (Previously Presented) The method for producing fibrous nanocarbon according to claim 88, wherein the dual-purpose catalyst/fluid material has an average particle diameter of 0.2 to 20 mm.

Claim 101 (Previously Presented) The method for producing fibrous nanocarbon according to claim 88, wherein the dual-purpose catalyst/fluid material comprises a product formed by supporting the catalyst on a surface of the carrier, or an agglomerate of the carrier.

Claim 102 (Previously Presented) The method for producing fibrous nanocarbon according to claim 88, wherein the carrier of the dual-purpose catalyst/fluid material is any one of carbon black, alumina, silica, silica sand, and aluminosilicate.

Claim 103 (Previously Presented) The method for producing fibrous nanocarbon according to claim 88, wherein the metal catalyst of the dual-purpose catalyst/fluid material is at least one of Fe, Ni, Co, Cu and Mo.

Claim 104 (Previously Presented) The method for producing fibrous nanocarbon according to claim 88, wherein a flow velocity in the fluidized bed reactor is 0.02 to 2 m/s.

Claim 105 (Previously Presented) The method for producing fibrous nanocarbon according to claim 88, wherein the metal catalyst of the dual-purpose catalyst/fluid material and the carbon material are brought into contact with each other for a certain period of time at a temperature of 300 to 1,300°C in a gas mixture of hydrogen and an inert gas (hydrogen partial pressure 0 to 90%) at a pressure of 0.1 to 25 atmospheres, so as to produce the fibrous nanocarbon.

Claim 106 (Previously Presented) The method for producing fibrous nanocarbon according to claim 96, wherein the dual-purpose catalyst/fluid material has an average particle diameter of 0.2 to 20 mm.

Claim 107 (Previously Presented) The method for producing fibrous nanocarbon according to claim 96, wherein the dual-purpose catalyst/fluid material comprises a product formed by supporting the catalyst on a surface of the carrier, or an agglomerate of the carrier.

Claim 108 (Previously Presented) The method for producing fibrous nanocarbon according to claim 96, wherein the carrier of the dual-purpose catalyst/fluid material is any one of carbon black, alumina, silica, silica sand, and aluminosilicate.

Claim 109 (Previously Presented) The method for producing fibrous nanocarbon according to claim 96, wherein the metal catalyst of the dual-purpose catalyst/fluid material is any one of Fe, Ni, Co, Cu and Mo, or is a mixture of at least two of these metals.

Claim 110 (Previously Presented) The method for producing fibrous nanocarbon according to claim 96, wherein a flow velocity in the fluidized bed reactors is 0.02 to 2 m/s.

Claim 111 (Previously Presented) The method for producing fibrous nanocarbon according to claim 96, wherein the metal catalyst of the dual-purpose catalyst/fluid material and the carbon material are brought into contact with each other for a certain period of time at a temperature of 300 to 1,300°C in a gas mixture of hydrogen and an inert gas (hydrogen partial pressure 0 to 90%) at a pressure of 0.1 to 25 atmospheres, so as to produce the fibrous nanocarbon.